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An Account of some Books.

- I. *Marcelli Malpighii ANATOMIE PLANTARUM; cui subjungitur Appendix, iteratas & auctas ejusdem de OVOLINCUBATO Observationes continens.* Londini, Impensis Joh. Martyn, ad insigne Campana in Cæmeterio D. Pauli, 1675. in fol.

THe Excellent Author undertakes in this Treatise to exhibit the Inward structure of Plants both by Discourse and Schemes, according to the Observations, himself hath made thereof by a Microscope; with a design, thereby to discover the causes of the several appearances, qualities and effects of Plants, as they may depend upon the various Position, Size and Shape of their parts, and upon the different ways of Percolation, Fermentation, and the like operations in the same.

He begins with the *Bark*, and proceeds to the *Woody part*, and the *Knobs*, and so on to the fabrick of the *Buds*, *Eloffoms*, *Leaves* and *Seeds*: Promising at the end to prepare another Work about the *Roots* and *Excrescences* of Plants; that so, having surveyed and well considered the History and matter of fact, he may proceed to make an Essay of what is thence deducible touching the Cause and Manner of *Vegetation*.

Concerning the *Bark*, he finds it to be made up of several parts, of which the prime ones are those he calls *Ligneous* or *Woody fibres*, in his opinion analogous to *Nerves*, which he saith are pipes pervious to a clear liquor; the structure of which Pipes consist in many square partitions, opening into one another. These vessels he finds to lye neither straight nor parallel, but to be for the most part compacted like little fagots; of which some do make a kind of Net-work, whereby the Bark becomes to be an aggregate of reticular coats, surrounding the Woody part of the plant: And as to what passes through them, he saith, that the Juyce being entred into them, is, by the heat of the Season striking upon the Soyl and forcing up the liquor, made to ascend a little way; and then by the survening night and cold stopt for the time, but is again, by

the heat of the next day, sending up more Juyce, thrust up higher from time to time, till it gets to the top, climbing thither as twere by steps: To which ascent it is marvellously assisted by the structure of these Pipes, being divided into square partitions, opening into one another, and furnish'd with something that performs the part of Valves, endowed with a Spring.

From these Pipes, he saith, do depend and break forth Horizontal ranks of Baggs or *Bubbles*, crossing those Fibres; into which bubbles the ascending Juyce, like a chyle, is discharged, and being stay'd there a while, and mixed with the old Juyce there residing, comes to be fermented, and advanced to the nature of an Aliment: Whence it comes to pass, that in many of those Bubbles there fall out due precipitations of a tartareous matter, which is condensed and hardned in these vessels. And 'tis in these Bubbles, saith he further, that much of this Juyce is digested, which afterwards is distributed to the Woody, and other parts of the Plant.

But, besides this preparation of the Aliment made in the *Bark*, there is another office, which that part seems to be appointed for; and that is the increase of the bulk of Plants, by adding yearly a coat or ring of Fibres, which being interwoven by these Horizontal ranks of Bubbles, and by degrees consolidated and hardned, do put on the nature of *Wood*.

The *Stem* or *Trunk* of Plants consists, 'according to him, of *Ligneous fibres*, transverse *ranks* of *Bubbles*, and *Air-pipes*. In young Trees, he saith, the ranks of these Bubbles pass into the very Pith; which pith is abounding in young Twigs, until by the growth and hardning of the ligneous fibres it wastes away. Now the clear Juyce, which through the Woody filaments riseth up into the stem and branches, is discharged into the lateral appendages of the Bubbles, and there advanced, as hath been said already, into a nourishing Juyce: And as in Animals the new Aliment enters under the form of Chyle into the Veins, where being mingled with the old blood, which is endow'd with several ferments, as the *lymph*a and others, and so circulated into the habit of the whole body, it enters into all the parts of it, in which it meets again with determinate ferments raising them to the peculiar nature of every part, transpiring

transpiring and precipitating what is useleſs; ſo in Plants the Juyce, conveyed through the ligneous pipes, is carried to the old Juyce harbour'd in the ſaid Bubbles, and is there and in the Pith fermented and further prepared, and kept to furniſh matter for future Buds and Leaves.

The *Air-pipes*, called alſo by him *ſpiral fibres*, are, in his opinion, a kind of Silver-colour'd plate, wreathed ſpirally, and ſo conſtituting an open hollow pipe, of a ſcaly texture, made up of little pipes and bladders, very like the Lungs of Inſects, admitting contraction and dilatation. Whence he concludes the great neceſſity and uſe of Air and Reſpiration in all thoſe Creatures that have even but the leaſt degree of life: Which Air, he ſaith, is in Plants taken-in chiefly by the Root out of the Earth, there being no ſuch conſpicious Air-pipes in the Bark or Leaves, whereas the Roots are exceedingly ſtored with them. This Air, contained in theſe pipes, and ſubject to compreſſion and rarefaction, preſſes by its ſwelling upon the contiguous Woody fibres and their adhering bubbles, and ſo squeezes out their Juyce into the neighbouring parts; which being relaxed and emptied, they admit and take in freſh liquor.

Such Plants, as inſtead of *clear* liquor contain in their fibrous pipes a *colour'd* Juyce, have a peculiar veſſel, as in the *Ebulus* (*Dane-wort*) fig. 30, and in all Laſtiferous and Reſinous plants, fig. 31. And each Plant ſeems to our Author to have a peculiar veſſel to contain and prepare the laſt and ſpecifick nourishment for that plant; ſuch as are thoſe, that hold the Turpentine and Roſin in ſome Trees; there being as many ſeveral ſorts of Juyces as there are *ſpecies* of Plants, and therefore peculiar Veſſels, preparing the laſt and proper juyce for each reſpective Plant.

The *Stems* of Trees and their Branches *increase* by the external addition of a new Coat of Fibres and Air-pipes, growing about them every year, and thereby giving them a new Ring of wood.

As to the *Knobs* of Plants, they are to our Author nothing but the productions of new Off-ſprings upon a new implication of Fibres and Air-pipes, for the ſhooting out of new Leaves, and young Sprouts or Buds.

A *Bud* is, as 'twere, the new *Fœtus* or Birth of a Plant, or a Sprout contracted in small, inclosing a tender woody part (raised from ligneous fibres and medullar bubbles) and the rudiments of the Leaves. Here our Author takes notice, that Nature, in ordering the several kinds of *Living* things, constantly proceeds in almost the same, or at least in an analogous, method: Considering, that in *Animals*, that are called perfect, she raises them from Eggs by a continual augmentation and nutrition to their due magnitude, joyning from time to time new particles to the former; yet so, that in every state of increase, that form, which was first of all in being, is still maintained, no part emerging anew in the Animal but Teeth and Horns; whereas in *Insects*, besides the increase, there come forth parts, whose rude lineaments lay hid before, in the Infancy of those Creatures; such as are Wings, Feelers, and the like: And to *Plants* she gives a daily increase by investing the trunk and branches with a Woody supercrescent Coat, but so, that from the tender Branches there spring forth every year young sprouts out of a precedent bud. And *as* in a Caterpillar the rudiments of some parts, being yet fluid, lye a pretty while concealed in little bags, until by the repose of the Insect, under the form of an *aurelia*, they grow and come forth more solid; so, saith our Author, the parts of a Branch lye at first hid in the bud, till afterwards being enlarged by the moisture and warmth of the Spring, they extend themselves into the form of a Sprout.

The *Leaves* are, to our Author, a considerable part of the Plant, seeing that all those parts, that are wrapt up in the stem or trunk, do, when opened in the extream and younger parts, break out into Leaves; so that these seem to be nothing but appendances to the Trunk lengthned and opened; the ligneous Pipes and Air-vessels, derived from the midst of the Woody cylinder of the tender Ring, running together into a bundle, and forming the Stalk, and at length upon their dilatation compleating the Leaf. The great variety of Leaves our Author deduces from the transverse ranks of Bubbles appendant to the woody pipes of the Stem, upon the opening of the Stalk.

The *Office* of the Leaves seems to him very considerable, forasmuch

forasmuch as, in his opinion, they perform the part of the *Skin* in Animals, which in them is so made up of Nerves, Veins, Arteries, Lympheducts, Tendons, and Glands, that the nourishing Juyce, by small passages conveyed into it, acquires a new texture and a new kind of fluidity, whereby what is uselefs is separated, and the rest, being returned into the inner habit of the Animals body, nourishes and repairs it. Thus, saith he, there are found in *Leaves* all the sorts of Vessels to be met within the body of Plants, as Air-vessels, Woody-fibres, and Vessels of Transpiration. This he illustrates by Observations taken from Insects, and upon whose skin abundance of moisture gathers together; they also frequently casting their skin, as Plants do their leaves. This opinion of his, viz. that the Nutritious Juyce is further concocted in the Leaves, he endeavours to render more probable by the consideration of the little Seminal Plant, which contains two Leaves; insinuating also, that from the Leaves there is a regress of the concocted Juyce into the stem, and consequently a peculiar circulation.

But to proceed; our Author esteeming the Branches to be produced for the generation of the Vegetable Egg, he teaches, sutably thereunto, that a *Blossom* or *Flower* is, as 'twere, the *Uterus* together with the Egg or *fœtus* of the Plant, which in due season is exposed to the Air, to make it grow at length into a new Offspring. In explaining the manner of the production of *Flowers*, and their variety, he is very curious; as he also is in that of *Seeds*; which latter he observes to be lodged in divers Cases or Caskets, performing the office of an *Uterus* and the parts thereof. And seeing the *Seed* grows in very many Plants to an edible *Fruit*, he describes the structure and parts of several Fruits, viz. *Figs*, *Cherries*, *Grapes*, *Pears*, *Citrons*, *Lemons*, *Oranges*, *Gourds*, *Straw-berries*, *Nuts*, *Almonds*, *Acorns*, *Chestnuts*, *Legums*, *Corn*, &c. taking notice of the singular apparatus, formed by Nature for the sake of the *Seed*, which he calls the *Fœtus* and the true compendium of a Plant, made up of all the principal parts thereof. Upon all which he enlarges with great accurateness.

But his Observations about *Galls*, and other Excrecences and Appendages of Trees, he reserves for another Discourse
(which

(which we have reason to expect within a little time;) yet noting here in short, that those Excrefcences are not the *Wombs*, in and by which, Trees and other Plants produce Insects; but only the Nests of the Egg cast there by the Animal parent, and not at all furnish'd by the Plant it self.

As to the *Use* of the parts of Plants, especially the passage of the Aliment, he is very sparing, and modest in giving his opinion about it, judging it difficult not to mistake herein. Mean time, he intersperses, in the Explication of their structure, his thoughts concerning it, having well considered the diversity of Vessels in Plants, *viz.* the great number of pervious Fibres in the Bark, the abundance of other Fibres in the Ligneous part, some of which are compos'd of a Spiral zone, others made up of roundish Bubbles, opening, as'twere, into one another; there being also a peculiar vessel, that yields Milk or Rozin.

Thus far of our Authors *ANATOMIE OF PLANTS*: Touching his *Appendix of Incubated Eggs*, he therein shews,

* These were also dedicated to the Royal Society, and by their Order printed A. 1673. by Mr. John Martyn.

with what care he hath repeated his former Observations upon that subject*; though he still scruples to determine, which of these two, the *Heart* or the *Blood*, hath the priority of existence in the Formation of a Chick: This only being certain to him, that there may be observed the *prima stamina* or first lineaments of the Chick even before Incubation, and that afterwards, by virtue of the Incubation there are first manifested the *vertebra*, and the beginnings of the Brain and the Spinal marrow, together with the Wings, and some Flesh; the Heart, Vessels, and Blood yet lying then concealed: But yet, because that some rivolets do appear in the umbilical *area*, he thinks it probable, that the Heart is then also appendant to the *carina* of the Chick, he having seen the Heart before the thirtieth hour: But 'tis a considerable time, he saith, before the Liquor passes through the Heart and the Vessels; which Liquor he hath observed to be first of a yellowish, then of a ruddy, and at last of a Blood-red colour. Whence he again offers his conjecture, that the Liquor, the Vessels and the Heart do exist before the Blood.

II. *Epistola ad D. Joëlem Langelotum de ALCALI & ACIDI Insufficiëntia ad gerendum munus Principiorum Corporum naturalium: Conscrip̃ta à Joh. Bohn Phil. & Med. D. in Acad. Lipsiensi. Lipsiæ, A. 1675. in 8º.*

IN this Epistle, as the Author declareth himself highly dissatisfied with the *Peripatetick* and *Chymical* Elements of Bodies natural, and affirms the Weakness of them to have been sufficiently laid open, and chiefly by the Experiments of those two great English Philosophers, *Bacon* and *Boyle* †; so he undertaketh to prove the Insufficiency of that lately celebrated *duumvirat* of Principles, the *Alkali* and *Acid*, by the congress and conflict of which the Maintainers of them presume to give an account of all the *phænomena* of Nature.

† The latter of which hath ready for the press a Discourse of the same Subject with this Epistle; which he was pleased to give a perusal of to the Publisher, before he would cast an eye upon this piece of our Author.

This Undertaking of our Author is here performed, 1. By representing the Obscurity of these two Principles: 2. By examining some Instances in which they are alledged to perform all the effects thereunto belonging. 3. By shewing the Necessity of at least one Principle more, as active as any of those two.

The *first* of these he endeavours to make out by taking notice in the *first place*, that as yet we have not so much as competent Definitions of an Acid and Alkali, and that those which are taken from our Senses are unsatisfactory for explaining the inward constitution of Bodies; there being some Substances endow'd with certain virtues or powers not discernable by any of our senses, and the Acids and Alkali's being capable of being reduced into such minute particles, as also of being sometimes thus dissociated by mixtures, that the Taste shall not at all be able to discover them, and that even in such Concrets, whose activity depends from one or other of those Principles.

Next, he considers, that that affection, which is ascribed to these Salin Principles, namely, their mutual Effervescence, is

is not of that latitude, as to explicate by it *all* the phenomena of Nature, though he denies not, that by means of their powers very many effects, and those admirable ones, may be explicated, such as are solutions, precipitations, distillations, sublimations, calcinations, &c. But that *all* cannot be by such a reaction accounted for, he instances *first* in the known vertue of Alcalys upon Mineral Sulphurs, such as Salt of Tartar or fixt Nitre and Common Sulphur, which may be reduced into white powder, out of which may be extracted a Tincture as well by these fixt Salts, as by the volatil ones of Sal Armoniac and Harts-horn, and by their means a Sulphur out of Antimony; yet *without* any sensible effervescence, even when they are prepared in *formâ humidâ*. *Secondly*, he instances in divers Rozins dissolved by the Whites of Eggs without any observable Effervescence, and in Turpentin dissolving several Gums without any commotion. To these he adds the Instance of the Coagulation of Quick-silver by the fume of melted Lead, without any reaction of an Acid and Alkali, that is perceivable.

Besides, he observes, that 'tis doubtful, whether all those Substances that do tumultuate with an Acid, are Alcalys, or that do boyl up with Alcalys, are Acid. For 1. *Acids* do boyl up with *Acids*, and mutually render turbid and do precipitate their Solutions; as Spirit of Salt or Vitriol works upon the Solution of Silver or Copper made by *Aqua-fortis* or Spirit of Nitre; as also Spirit of Vitriol, and Spirit of Salt heats, and turns into a whitish *Offa*, by a Solution of Saturn, made with distilled Vinegar; And *Aqua-fortis* and Spirit of Nitre, though they make no sensible ebullition in the said Liquor, yet they cause the particles of Saturn to subside at the bottom in the form of a whitish powder.

Moreover, he notes, that an Acid is put into commotion by that which is neither an Acid or Alcalys; as Oyl of Vitriol mingled with either common or distilled Water, and likewise with spirit of Wine and oyl of Turpentine.

Again, he finds also, that neither all what boyls up with an Alkali, or receiveth it into it self, is therefore presently to be taken for an Acid; because the liquor of Nitre fixed by coals, and Oyl of Tartar, do as well as juyce of Citron, Vinegar, &c.

separate

separate the parts of Milk ; which, he saith, he hath also often seen done by putting Gall into Milk.

Having dispatcht these particulars, he proceeds to shew *secondly* by divers Instances, that many effects are commonly ascribed to Acids and Alcalys, which are not due to them, because they are either not at all to be found in those bodies, whence such effects proceed, or not in that quantity, which is necessary to master and subdue the power of the other parts of the Concret.

Lastly, to evince, that there is at least a *third* principle in Concrets, that hath as great a power to act, as those two ; he instances in the Amalgamation of Gold and other Mettals, that is performed with Quick-silver, which is so mixed with them *per minima*, that they are changed together into an unctuous mass ; whereupon, the Mercury being separated again, either by passing it through Leather, or by distillation, or by flowers of Sulphur kindled, the Mettals appear again in the form of a very subtile *calx*. But now, that there should proceed from Mercury, or any Acid ingredient thereof, a calcining power, the known effect of Acids being Corrosion, our Author cannot assent to : Especially since, as he affirms, Mercury highly rectified and freed from all its acidity, retains notwithstanding its former amalgamating and corroding vertue.

What this *third* ingredient of Concrets should be, our Author thinks difficult to determine ; he offers only to call it the Sweet and Inflammable Principle in Combustible bodies : Yet would not be understood to esteem it a Catholick principle, nor to exclude a fourth or more Principles. All which he concludes with a discourse tending to evince, that the Inflammability of Bodies depends not upon their Acidity.

IV. *Zymologia Chymica, or a Philosophical Discourse of Fermentation, from a New Hypothesis of Acidum and Sulphur; With an additional Discourse of the Sulphur-Bath at Knarlbrough: By W. Sympfon M.D, London, 1675, in 8°.*

THE Learned Author, not being satisfied with any thing he had yet seen extant upon this argument of *Fermentation*, propounds in this Tract a New *Hypothesis*, as an *Essay* towards the further improvement of that noble Doctrine; endeavouring to solve, from the inward conflicts of *Acidum* and *Sulphur*, the phenomena of all *Hot-Baths*, the generation of *Minerals*, the production of many *Spaw-waters*, the grand appearances of *Heat, Fire and Light*; as also various other Subterranean phenomena, as *Damps, Earthquakes, Eruptions*; likewise the appearances of *Meteors*, and divers other both remarkable and entertaining effects.

In the doing of this he *first* explains, what he means by *Fermentation*; and *secondly* sets forth the large extent thereof in the whole orb of Nature.

He defines *Fermentation* to be nothing else but an intestine Collision betwixt *Acidum* and *Sulphur*, put together by Nature or Art, and set into a combating motion, in order to the production of Concrets, or to some other equivalent end.

This definition he applies *first* to the productions in the *Mineral* kingdom, undertaking to solve from those two Principles the phenomena of *Hot-baths*, and the production of *Minerals*, and other subterranean appearances. Where he lays down two positions, whereof one is, that there is no *Hot-bath* without *Sulphur*; the other, that an *Acid* is necessarily requisite in all *Mineral* fermentations: Declaring withal, what he means by *Sulphur*, and how *Hot-baths* differ chiefly according to the difference of their *Sulphurs*; and which of them are safely, or not safely to be taken *inwardly*: Endeavouring also to shew, how from the principles specified, put into fermentation, the waters passing through them must necessarily become *hot*; confirming this by an induction of Experiments, shewing, how *Sulphur* by Fermentation becomes to be commi-
nuted,

nuted, volatilized, and made capable of Solution in *Water*, as happens in all Baths: All which he illustrates by a Parallel betwixt *Mineral* and *Vegetable* Fermentations; esteeming, that Vegetation is nothing but a natural slow-paced Fermentation from each Plants peculiar principles of Acid and Sulphur.

In this part he examines and disallows both *Tachenius* his Hypothesis of *Acids* and *Alcalys*, and the Cause assigned by divers Authors of the *Heat* in Natural Baths, viz. *Subterranean fires*; and withal removes the grand Objection alledged against *Sulphurs* being the cause of Heat in Baths, viz. that if *Sulphur* can give actual heat, it must burn; asserting, that Sulphur may be one of the efficient of Heat in Baths, and yet its *flagration* not requisite at all.

Discoursing of the *Acidum*, as the other cause of all Mineral Fermentations, he declares, that he means here by *acidum* either such as is inbred in the same Mineral concretion, whilst in *succo-soluto*, in the beginning of its generation; or an extrinsick supervening one, which is powerful in the reduction of Minerals already solid and compleated. This done, he proceeds to prove, that there are Acid juyces in the bowels of the Earth, and that these are either embryonative to the same Mineral where the Sulphur is, or else peculiar to some other body by which the transient Waters become acuated.

Explaining, *How* the waters in *Hot-baths* become hot, he endeavours to shew, *first*, that some sorts of *Acids* have so powerful an operation upon *Sulphurs*, as that being put into motion they are sufficient causes of fermentation in Mineral Juyces; and *next*, that *heat* is the necessary and immediate result of such fermentation: Where he takes notice, that the fermentation, made betwixt *Spirit* of *Nitre* and *Butter* of *Antimony*, is not from the *Salts* in the sublimate mixing with the Acid in the dissolvent, because, *saieth he*, the same, poured upon the same Salts while incorporated with *Mercury* in the form of Sublimate, causeth no such fermentation; yea, he affirms to have seen Sublimate, wherein the aforefaid Salts that are in Butter of Antimony are lodged, dissolve in an *acid*, without the least sensible ebullition, near as soon as Ice in warm water. To this he adds, that 'tis *water* that sets the *inbred* principles of *acidum* and *sulphur* into a greater inward commotion, and makes the fermentation the

stronger, and consequently the *heat* greater; witness that a little water, put to *Oil of Vitriol*, presently sets the fermental principles of acidum and sulphur, connatural to that *Oil*, into a strong ebullition, whence results so great a heat, as the glass, 'tis done in, can hardly be endur'd by the hand, especially if the *Oil* be well rectified; which he confirms by the Observation of good Authors, asserting that in many places *Mines* are found so hot, that they can hardly be touch't: As the *Minera* of *Allom*, or *Vitriol*, being broken and expos'd to the Air, contract so strong a heat, as sometimes to cause an actual ignition, by which (he saith) not long since a *Barn* at *Yeeland* near *Halifax* was burnt.

Having thus deliver'd his *Hypothesis* of the causes of *Hot Baths* from the fermentation of mineral Juices, caused by acids and sulphurs, he goes on to solve from thence various other subterranean Effects, such as are *Damps*, *Poysonous Springs* and *Lakes*, as also those of *Earth-quakes*, *Eruptions*, *Concrete sulphurs*, *Spaw-waters*; concerning the last of which he saith, that where there is a current of water irrorating some Earths or mineral beds of Iron or Alom-stone, there are made Vitrioline or Aluminous Spaws. Hence he desires his Reader to consider, whether from the same supposition of causes may be solved the *diversity* of *Winds*, the *vicissitudes* of *Heat* and *Cold*, the appearances of *Meteors*, *Snow*, *Hail*, &c. He offers also, from the same principles to explain the two great phenomena of *Heat* and *Light*, found in concrete bodies; yet leaving it to further examination, whether in that great Fountain of *Light*, the *Sun*, its perpetual emanation of *Light* may not consist in a peculiar fermentation of its own, set a work by the Creator, and kept a foot by a continual circulation of *Ethereal matter*: Endeavouring in the mean time to shew, 1. How *Heat* is produced from fermentation in all such bodies where 'tis found. 2. How from the same Principles of *Acid* and *Sulphur* *Light* is made. Where by the by, he labours to prove, that the Fermentation in Mineral Juices, whether natural or artificial, proceeds not from the *Contrariety* of *Salts*, because there is no such ebullition among *Salts*, but what is from the conflict of *Acids* and *Sulphurs*, whereas it never yet could be made appear (saith he) that these minerals contain'd any sort of *Alkalies*, either fixt or volatile, though it be certain to him from irrefragable experiments, that *Sulphurs* and *Acids* are separable from them

them all. And as he shews this in *Minerals*, so he undertakes to do it in the Fermentation of *Animals* in all the degrees of digestion made in their bodies ; deriving also those spurious fermentations of the Blood, that cause Feavours of all sorts, from *Acids* not congenial, but wholly disagreeable, and heightening the natural gentle fermentation to an inflammation of the blood and other Juices : ascribing likewise all the *poysonous properties* of Venemous Animals to the invigorated ferments of their juices, raised to that height, as to become poisonous fire, which by a bite or sting getting admission into the blood of a human body, will, according to their several degrees, in their passage bear down and mortifie the spirits thereof. Whence he endeavours to give an account of the effects of those *Fiery Serpents*, we read of in Holy Writ, and of that matter called *Gecco*, vomited by some sort of venemous creatures, upon their being whip'd and hung up (which exasperates their ferments,) which matter is used by some *Indians* as a speedy death to their Malefactors, by pricking the skin under a nayl of the hand, and applying a little quantity thereof to it, which immediately getting into the blood, presently suspends the natural fermentation thereof, and mortifying the spirits, kills presently.

Having shew'd this in *Minerals* and *Animals*, he attempts also to verifie it in *Vegetables*, viz. that *Vegetation* is nothing else but a gentle collision of the Vegetable Acid and Sulphur in every seed, after the loosening of the body in the Earth ; which ceaseth not, till the body, shap'd according to the form of those minute types wrapt up in the seedlings, and often visible by Microscopes, is in all its pourtrayings brought upon the visible stage of the world. And from such a fermentation he would also deduce the *Colors, Savors, Odors* of Vegetables, and their *Medicinal* qualifications, and their *Propagation by seeds* ; as also the reduction of Corn, Grapes, Fruits, &c. into Bread and Drink ; observing, that if the acidum of Paste, Must, Wort, or the like fermentable liquors, be by the addition of any other thing precipitated, alter'd, or mortified, then will those liquors never ferment ; since that Quick-lime, Coral, Crabs-eyes, or any sort of *fixt Lixivial Salts*, being added thereto, before it begin, will prevent, or, if while fermenting, will stop the fermentation.

He proceeds to explain, that the most violent of *Fires* is no other than this *Fermentation* in the most rapid manner, the said Principles furiously driving up each other; alledging, for the evidencing hereof, the Experiment of taking of Spirit of Venice *Turpentine* four ounces, and of *Aqua-fortis* six ounces, both recently drawn, which, being mixt together in a Glass-viol, will presently fall into a furious fermentation, arising to that height, as actually, among the thick fumes, to burn and blaze out of and above the outside of the Glass in a visible flame. And thus he would have all *actual Flagrations*, whether from the violent assaults of fiery Acido-sulphureous Liquors (as in the newly recited Experiment) or from *Acids* and *Sulphurs*, set in to intestine conflicts in combustible concretes, (as in all usual fire,) to be no other than his described Fermentation in a most violent hurry, the principles acting furiously upon each other; whilst other *flower fires* are maintained by slighter and more *gentle touches* of the same principles.

And as to those Fermentations, that are said to be made betwixt *Acids* and all kinds of *Alcaly's*, whether lixivial or alcalisate, fixt or volatile; the heat also caused from the attrition or collision of solid and hard bodies; our Author is of opinion, that those fermentations are referrable to his principles, and that upon a double account; either, that *Acids*, when mixed with these *Alcaly's*, do meet with the *Sulphur* close bound up with the *Acid* and Urinous spirit or Salt in the *compages* of the *Alkali*, and so cause an ebullition; or that they meet with the volatile urinous Salt close riveted with the *Sulphur* and acid, and so cause an effervescence. Where yet he shews the difference, that is to be noted in the Fermentations made between *Acids* and *Sulphurs* as they happen in Petrifick concretions and fixt Lixivial *Alcaly's*, from those that happen in the general course of Nature, among Animals, Vegetables and Minerals. To which he adds an account of the fermentation in *Quick lime* upon the effusion of water, and how that the *acidum* in that substance owes its original to no other than that of the Fire, contracted in the calcination of the stone, and was not præexistent *before* calcination. To which power of the *acidum* in Quick-lime, communicated thereto by Fire in the calcination, our Author imputes it, that the *Water of Lime* will

will perform what other more usual Acids cannot: *E. g.* that *Lime-water* mixed with any *volatile Urinous Salts*, and distilled there-from, fixes the Salt, and even turns it into an insipid powder, or indissoluble calx, &c. After which, he spends a Chapter in explaining, how the Heat and Ignition, which is caused from the Collisions and Attritions of *hard* bodies, may be easily solved from the Principles delivered by him.

And having run through the Causes of *Heat* and *Fire*, as the result from all sorts of Fermentations, and shew'd, *Heat* to be *Fire* in a remiss, and *Fire* *Heat* in an intense, degree, as also, that these Fermentations proceed from a conflict of *Acidum* and *Sulphur*, excepting those made from an intestine combat of an *Acid* and a fixt *Alkali*, or an *Acidum* and *Urinous spirits*; he comes to explain, How from his doctrine of Fermentation may be solved that grand phenomenon of *Light*; and *first*, the *Light* from *Culinary-fire* or ordinary combustible concretes, put into that rapid fermentation we call *Fire*: *Next*, the *Light* of all *Sulphurous matters*; whether in the dry form of *Mineral sulphurs*, *resinous Gums*, *Turpentine*, *Axungia's*, &c. or in Liquids, as *Bitumens*, *Oyls*, *Vinous spirits*, &c: Then, the *Light* of *rotten Wood*, *long-dried Fish*, *Glowworms*, *Cats eyes*; as also that from *Attrition of Wood*, and of *Steel* and *Flint*; from the *friction* or *combing of Animals*; and likewise the *Light* of *subterranean Lamps*: Upon which last Head he somewhat enlargeth by discoursing of the possibility in nature of such a-kind of *Fire*, that may be maintained and perpetuated *without Air*; affirming, that himself hath seen a *Flame* or *Fire* in the cavity of a *Glass*, which as soon as the stopple was taken out, was (contrary to all other fires) immediately extinguish'd. To which he subjoyns an explication of the *Light* of some *precious Stones*, the *Bononian stone*, and likewise of *Meteors*; all which give light in the *Air* not illuminated by any light from the *Sun*, but by an excitation of their intrinsic Ferments, setting above-board their inside *tepor*.

He concludes the whole, *partly* by confirming his Principles from collateral authority; *partly* by shewing, How that all manner of *Coagulations*, *Congelations*, *Condensations*, *Salifications*, *Petrifications*, and all sorts of *Concretions* of bodies (or of Juices into bodies,) are primarily ascribable to *Acids*; and that
by

by these Concretions the connate *Acidum* so combines with the *Sulphurous* parts it closeth with, as that both pass into a *tertium quid*, or neutral result, partaking of both, and yet distinguishable by neither; insomuch that the *Acidum* by such sort of coagulations and concretions looses its sting, and becomes altogether unperceivable: Whence he draws the reason, why, though *Acids* be the very foundation of all coagulations and concretions of bodies, yet are themselves to our taste in many things the least discoverable: Which particular he endeavours to make out by *artificial* mixtures, resembling the *natural*, seeing we cannot easily get to the insides of bodies in their natural productions.

As to his discourse of the *Sulphur-Bath* at *Knarsborough* in *Yorkshire*, concerning its *Causes* and *Vertues*, we shall refer the Reader to the Tract it self.

Errata in *Numb.* 116.

In the Contents l.5.r. *bleak* for *black*; noting the same p.357.l.4, and 23. p.357.l.numb.179. for 176, p.360. l.6.r. *tritire* for *mixture*, p.362.l.15. r. *take the better.* ibid.l.ult.r. *work*, p.363.l.2 r. *walking speed*, ibid.l.29. r. *from the steepest.*

N.B. in *Numb.* 112. p.273.l.3 and 4. read, *is by the Cycloid*: which, upon a fresh perusal of that *Extract*, we took notice of, though too late.

L O N D O N,

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